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09/560,469	04/28/2000	JOSEPH A FERNANDO	UNF-9058-A	3786

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EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/560,469	FERNANDO ET AL.	
	Examiner	Art Unit	
	JENNIFER A. LEUNG	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-13,16-27,41-44 and 47-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-13,16-27,41-44 and 47-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on March 24, 2008 has been carefully considered. Claims 3, 4, 14, 15, 28-40, 45 and 46 are cancelled. Claims 1, 2, 5-13, 16-27, 41-44 and 47-57 are under consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 are rejected under 35 U.S.C. 103(a) as obvious over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833).

Regarding claims 1, 8, 9, 12, 19-25, 47, 52, 53, 56 and 57, Robinson et al. (see FIG. 1; column 4, line 55 to column 7, line 40) discloses a device **10** comprising:

a housing **12** having an inlet **14** at one end and an outlet (not shown) at an opposite end through which exhaust gases flow; a fragile structure (i.e., monolith **18**) resiliently mounted

within said housing, said fragile structure having an outer surface and an inlet end surface at one end in communication with said inlet **14** and an outlet end surface at an opposite end in communication with said outlet; and a support element (i.e., a mounting mat **20**) disposed between the housing **12** and the fragile structure **18**, said support element **20** comprising an integral, substantially non-expanding ply of polycrystalline ceramic fibers comprising about 40 weight percent to about 60 weight percent alumina and about 60 weight percent to about 40 weight percent silica (see column 5, lines 33-64).

The apparatus of Robinson et al. is the same as the instantly claimed apparatus, except that Robinson et al. is silent as to the support element **20** being made from ceramic fibers having the physical properties of fibers that are formed according to the instantly claimed time-temperature heating regimen.

Myles teaches a ceramic fiber, suitable for forming a fiber blanket or mat to be used in a high temperature apparatus (see column 3, line 65 to column 4, line 10), wherein said ceramic fiber is melt-formed and comprises about 40 wt.% to about 60 wt.% alumina and about 60 wt.% to about 40 wt.% silica (see column 2, lines 36-40). In particular, the ceramic fiber is prepared according to a time-temperature regimen of heating said fibers to a temperature of 990°C to at least 1050°C for greater than 1 hour, or heating said fibers to a sufficient temperature above the devitrification temperature of the fiber material for an effective amount of time to produce a microcrystalline fiber (see column 3, lines 12-64).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the heat treated, melt formed ceramic fibers of Myles for the ceramic fibers present in the support element **20** in the apparatus of Robinson et al., on the basis of

suitability for the intended use and absent a showing of unexpected results thereof, because the ceramic fibers of Myles retain sufficient flexibility and show dramatically less shrinkage under high temperature use (see column 6, lines 4-11). Furthermore, the substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958); and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 550 U.S. --, 82 USPQ2d 1385 (2007).

Given that the time-temperature regimen as taught by Myles is identical to or substantially identical to the time-temperature regimen being claimed by Applicants, the heat treated ceramic fibers of Myles will be identical to or substantially identical to the instantly claimed ceramic fibers having a crystallite size of greater than 200 Å to about 500 Å, and a crystallinity from about 5 to 50 percent.

And, even if the properties were not inherent, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select the appropriate time and temperature parameters for producing a ceramic fiber having the instantly claimed physical properties of crystallinity and crystallite size in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the specific crystallinity and crystallite size are not considered to confer patentability to the claim since the precise crystallinity and crystallite size would have been considered a result effective variable by one having ordinary skill in the art (see Myles: column 3, lines 21-58).

Accordingly, one having ordinary skill in the art would have routinely optimized the heating time and temperature ranges for producing a suitable crystallinity and crystallite size in the polycrystalline ceramic fibers, to obtain the desired flexibility and shrink resistance, for instance, in the support element/mat for holding the fragile structure in Robinson et al., *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Because the modified apparatus of Robinson et al. comprises all of the instantly claimed components, the support element will inherently exhibit the specified minimum residual pressures for holding the fragile structure within the housing after 200 cycles of testing at 900 °C or after 1000 cycles of testing at 750 °C.

Regarding claims 2, 13 and 48, Robinson et al. further discloses that the fragile structure **18** has a perimeter, at least a portion of which is integrally wrapped by the support element **20** (see FIG. 1; column 9, lines 26-30).

Regarding claims 5, 6, 16, 17, 49 and 50, Myles further teaches that the ceramic fibers have an average diameter ranging from about 1 micron to about 14 microns, or from about 3 microns to about 6.5 microns (see column 2, lines 50-53).

Regarding claims 10, 11, 26, 27, 54 and 55, Robinson et al. further discloses that the exhaust gas treatment device may comprise a catalytic converter or a diesel particulate trap (see column 4 lines 55-62).

3. Claims 7, 18, 41-44 and 51 are rejected under 35 U.S.C. 103(a) as obvious over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833), as applied to claims 1, 9, 12 and 21, and

further in view of Sasaki et al. (JP 07-286514).

Regarding claims 7, 18 and 51, Robinson discloses that the ceramic fibers should be substantially shot free, e.g., on the order of about 5 percent nominally or less (see column 5, line 65 to column 6, line 1). Sasaki et al. also teaches a ceramic fiber having a shot content of 5% by weight or less (see section [0007]). It would have been obvious for one of ordinary skill in the art at the time the invention was made to maintain a shot content of less than about 10% in the ceramic fibers forming the support element/mat in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because when larger amounts of shot are present in the ceramic fiber, the specific gravity of portions of the support element/mat increases, and thermal conductivity becomes uneven, resulting in an inability to evenly hold the fragile structure, as taught by Sasaki et al.

Regarding claims 41-44, the collective teaching of Robinson and Myles is silent as to the support element/mat being needled. Sasaki teaches a support element/mat comprising ceramic fibers, in which said support element/mat is needled (see sections [0008], [0009]). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide needling to the support element/mat in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the needling orients some of the ceramic fibers in the vertical direction to tightly bind the support element/mat, so that the bulk density of the support element/mat is increased and separation or shifting of the layers of the support element/mat can be prevented, as taught by Sasaki et al.

Response to Arguments

4. In view of Applicant's amendment to claims 1, 12 and 47, the Examiner has withdrawn

the rejection of claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 under 35 U.S.C. 103(a) as obvious over Robinson et al. in view of Johnson et al.; and the rejection of claims 7, 18, 41-44 and 51 under 35 U.S.C. 103(a) as obvious over Robinson et al. in view of Johnson et al., and further in view of Sasaki et al.

5. Applicant's arguments filed March 24, 2008 with respect to the rejection of claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 under 35 U.S.C. 103(a) as obvious over Robinson et al. in view of Myles; and the rejection of claims 7, 18, 41-44 and 51 under 35 U.S.C. 103(a) as obvious over Robinson et al. in view of Myles, and further in view of Sasaki et al., have been fully considered, but they are not persuasive.

Applicant (at page 11, first paragraph) argues that there is no reasonable expectation of success for the combination of Myles and Robinson since,

> "Myles is directed to a refractory fiber for use in a furnace. A furnace is a static structure that is commonly used in a controlled environment. Myles does not teach that the fiber disclosed is useful in any application other than furnaces, or that the fiber might be used in mechanically or thermally dynamic environments, such as in a catalytic converter."

The Examiner respectfully disagrees.

Firstly, Applicant argues that the ceramic fibers of Myles would not successfully operate within the catalytic converter environment of Robinson since the catalytic converter is exposed to "varied and significant dynamic forces" under driving conditions (under heading 1A).

Robinson, however, discloses that the catalytic converter is not limited to automotive applications. In fact, Robinson specifically discloses that the catalytic converter may be used in a "static" environment, such as a chemical industry emission (exhaust) stack. (see column 4, lines 63-65). Furthermore, the Examiner asserts that the ceramic fibers of Myles would be

suitable for use in static environments as well as dynamic environments, because a mat comprising said fibers is highly flexible. For example, the mat "can be bent in an arc having a radius of about 1.5 centimeters at a mat thickness of about 2.54 centimeters without significant breaking of the fibers." (see column 2, lines 23-28).

Secondly, Robinson discloses that characteristics which allow for a mounting mat to operate successfully within a catalytic converter include: good handleability and fabrication characteristics, the capability to withstand high temperatures without degradation while maintaining stable pressure over a wide range of operating temperatures, and flexibility without the use of additional means to maintain its structural integrity (see column 3, lines 40-54). The Examiner asserts that a mounting mat formed from the ceramic fibers of Myles would possess all of these desired characteristics, since a blanket or mat of said ceramic fibers "can be used at temperatures as high as 1425 °C with less than 2 percent linear shrinkage yet are sufficiently flexible… without an unacceptable amount of cracking or breaking of the fibers or mats." (see, e.g., column 3, line 65 to column 4, line 10). Because shrinkage is at a minimum, a mounting mat formed from the ceramic fibers of Myles would predictably maintain a stable pressure on the fragile structure within the housing of Robinson, even at temperatures as high as 1425 °C.

Because all of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.

Lastly, it is noted that Applicant has not provided any supporting evidence for their assertion that the ceramic fibers of Myles would not successfully operate within the mechanically and/or thermally dynamic conditions described in Robinson and argued by

Applicant under headings 1A and 1B.

Applicant (at page 15, second paragraph) further argues that there would have been no motivation to combine the teachings of Sasaki and Myles, since Sasaki "teaches away" from Myles. In particular, Applicant argues that, "[b]ecause the ranges of alumina and silica taught by Myles and Sasaki are both mutually exclusive, Myles and Sasaki teach away from one another and cannot be combined."

The Examiner respectfully disagrees. Please note that Sasaki was merely relied upon for its general teachings that, 1) the shot content should be set at a minimum, since when larger amounts of shot are present in the ceramic fiber, the specific gravity of portions of the support mat increases, and thermal conductivity becomes uneven, resulting in an inability to evenly hold the fragile structure; and 2) the conventionality of using needling for binding ceramic fibers into a mat form, in order to densify the mat and to prevent shifting or separation of the ceramic fiber layers. Teaching 1) of Sasaki further parallels the teaching made by the primary reference to Robinson et al. – namely, ceramic fibers should be substantially shot free (see column 5, line 65 to column 6, line 1). The combination of references does not change the principle of operation of the primary reference or render the reference inoperable for its intended purpose. Furthermore, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571)272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Primary Examiner, Art Unit 1797